

Public Reading Room

U. S. Department of Energy DEPARTMENT OF ENERGY
Idaho Operations Office ADVANCED NEUTRON SOURCE
Fact Sheet

What is it? The Advanced Neutron Source (ANS) is a new research laboratory applicable to a broad range of scientific disciplines, such as structural biology, materials research and testing, and environmental pollutant analysis. Scheduled for completion in the year 2002, the ANS facility will attract and accommodate more than 1000 guest users from industry, universities, and government each year. At the heart of the ANS is a research reactor with unprecedented neutron flux, or intensity. The reactor will produce the neutrons used for experiments and for making isotopes used by medicine and industry. The reactor's 300 megawatts of thermal power is approximately one-tenth that of a typical nuclear power reactor used for producing electricity. When complete, the ANS site will encompass approximately 85 acres and will include facilities to house the reactor, experiment laboratories, guest residences, waste treatment areas, and support groups and offices.

Why build it? Neutron research is vital to industrial strength. It has been the basis for products and technologies that are all around us. A few examples include high-tech plastics that are stronger than steel, computer disks, geologic maps of oil deposits, and silicon chips for electronics. It also forms the basis for medical procedures that are used millions of times each year in the United States alone. Neutrons are used to test materials for use in future fusion devices, for aerospace production, and to examine structures such as airplane wings for otherwise undetectable structural flaws.

The existing major U.S. neutron research facilities are old, outdated for neutron research, and are approaching the end of their useful lifetimes. When they are gone, barring construction of a new laboratory such as the ANS, the United States will be dependent upon Europe, Japan, and the former Soviet Union for places to carry out neutron research and isotope production. Research dollars will be lost along with industry and talented scientists.

What is the ANS mission? The mission of the ANS Project is to be the world's foremost center for neutron beam research; to provide high-flux irradiation capabilities unequalled anywhere in the world; and to be a center for education and for the development of new research areas using neutrons.

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Local impact There are benefits to the ANS's home community that complement being the world's premier center for neutron research. The construction phase of the complex will mean nearly 4,000 new jobs including prime contractors, subcontractors, and their support groups. This will generate an estimated \$512 million in total incomes for the area and

\$107.75 million in combined local and state sales tax revenues. Annual operations of the facility will maintain more than 2,000 primary and secondary jobs in the region, yielding an estimated \$51.44 million in total income and \$6.23 million in local and state sales tax revenues.

Major applications

The ANS will be the world's best facility for neutron scattering experiments, which are used extensively in studying the atomic structures of materials ranging from high-tech metal alloys to biological systems such as DNA. Neutron radiography, also available at ANS laboratories, will allow researchers to peer into the workings of mechanical systems such as jet engines to study fuel flow. The technique, similar to X-ray technology but with much greater contrast, is also used for explosives detection. Materials irradiation experiments at the ANS will reveal the best alloys for use in the fusion reactors of the future and for improving the many power reactors in service worldwide today. The ANS will be used to produce isotopes used in industrial processes and in medicine, such as the californium-252 and palladium-103 used in cancer treatment. Using neutron activation analysis, scientists will be able to discern trace amounts of elements in materials that require high degrees of purity, such as silicon for semiconductor applications, or biological samples, such as bodily fluids.

Education

The ANS Project is committed to involving university groups in its research and development tasks. Past and present collaborators include the University of Tennessee, the Georgia Institute of Technology, the University of Virginia, the Massachusetts Institute of Technology, and the University of California.

The project also diligently seeks to create opportunities to involve college undergraduate and graduate students, as well as faculty, through various programs that provide summer appointments at national laboratories.

Schedule

The preliminary design phase of the ANS complex is set to begin in October 1993, followed two years later, in October 1995, with the beginning of detailed design. Construction will start in June 1996 and will be complete in March 2001. The first nuclear reactions, or "criticality," will be produced in April 2002. Commissioning of the reactor should be complete in September of that same year, with operations beginning the following month, October 2002.